CLOOS

Weld your way.

Seminars

"Our aim is to make our customers' welding processes more efficient.

We want to give our customers considerable advantages with innovative products such as QINEO® and QIROX®. "

CLOOS

Weld your way.

CLOOS: Your brand for innovative welding technology!

Providing added value for our customers! This is the motivational force behind our 700 employees. We are constantly raising our bar by pushing ourselves to provide innovative welding processes and solutions that will contribute to the long-term commercial success of your company!

Our process competence is at the forefront in welding and cutting of various ferrous and non-ferrous metals. We offer our customers individual solutions which are optimized and adapted specifically to your product and production requirements.
Leadership and competence equals process automation and welding at its best. Whatever your needs are,
we **"Weld your way."**

CLOOS develops, manufactures and delivers innovative solutions to more than 40 countries worldwide. With our QINEO®, the new generation of welding machines for manual and automated applications, and
QIROX®, the system for automated welding and cutting, our product range covers the entire spectrum of arc welding technology. Our product portfolio includes intelligent software, sensor and safety technology solutions – all of which are customised to meet your specific needs and requirements!

CLOOS provides full service solutions – all from a single source!

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Seminars by CLOOS: Learn from specialists

CLOOS have been involved as robot operators for about three decades and

attach as great importance to a thorough training in robot and welding technology as the majority of end users.

Customers come from Germany and abroad to be trained at the training centre in Haiger. In addition our customers are kept up-to-date due to a continual flow of information from CLOOS subsidiaries and agencies in Germany and abroad.

CLOOS offers a multitude of technical products and and their further development is getting faster and faster. To keep up with this development our customers and sales partners all over the world use our versatile training courses. The trainers of the CLOOS training centre are your competent partners together with a customer-oriented scheduling organisation thus offering you high-quality and practical trainings for all CLOOS products.

Training at the highest level

Foreign and German operators are trained in programming and operation in the modern, well equipped CLOOS training centre. In team work customers, CLOOS employees, our agents' service engineers are prepared for the special demands of robot technology with the aid of components, which are similar to those used in practise.

The training centre in the CLOOS parent company in Haiger disposes of a surface of approx. 700 m² and five technically fully-equipped training rooms for theoretical instruction. 11 robot systems with peripheral equipment are available to deepen the theoretical knowledge of our participants.

Qualified training management

The respective trainers are able to pass on their know-how they gained in long years of practical experience in different departments within the CLOOS-Organisation.

The seminar participants highly appreciate this advantage and express it in our "Happy sheet" questionnaire.

Their satisfaction is a very important quality criterion for our trainers who regularly update their knowledge, too. The rising number of participants is a sign of appreciation of our training and our motivation to always keep you and us up-to-date.

Perfect quality due to profound knowledge

The introduction and application of the robot technology requires a higher qualification at the workplace. Therefore, the employees have to be trained well to use the robot technology in a competent and efficient manner.

The user has to know how to operate and program the robot and to maintain it. CLOOS as a manufacturer of flexible robot systems offers the appropriate training programs thus making a significant contribution to the satisfactory functioning of the robot system or the "flexible production systems".

Seminar overview

Information and operation	Programming and software	Service
Product seminar ■ QIROX® and QINEO®	**Programming QIROX®/ROTROL II** ■ Basic Course QIROX® ■ Advanced Course QIROX® ■ Expert Course QIROX® ■ Upgrade Course Teach pendant ■ Refreshing Course	**Service QIROX®/ROTROL II/R32T** ■ Electricians QIROX® V6 ■ Electricians QIROX® V5 ■ Electricians QIROX® V4 ■ Electricians R32T V3 ■ Electricians R32T V1-2
Information seminar ■ Robot technology ■ Welding technology		
Operator seminar ■ Operator	**Programming R32T** ■ Basic course R32T ■ Advanced course R32T	■ Mechanical engineers QRC / QRH /-E ■ Mechanical engineers R320, R350, R410 ■ Mechanical engineers R260, R310, R410
Optimisation of welding processes ■ Robot Welding ■ Robot Tandem Welding	**Offline Programming** ■ Basic course RoboPlan ■ Advanced course RoboPlan	
Adjustment Welding Power Sources ■ QINEO® Step, Basic ■ QINEO® Tronic ■ QINEO® Tronic Pulse ■ QINEO® Pulse ■ QINEO Champ ■ Quinto II	**Laser Programming** ■ Basic course Online laser sensor ■ Advanced course Online laser sensor ■ Offline laser sensor	**Service Welding Machines** ■ QINEO® Step, Basic ■ QINEO® Tronic, Tronic Pulse ■ QINEO® Pulse, Champ ■ Quinto II
Welding processes ■ Duo Pulse ■ Cold Weld ■ Pulse Arc ■ Rapid Weld	**Software** ■ Software products PDM, UMS, RMS, Carola Edi ■ Safety Controller ■ QINEO® Data Manager ■ Validation ■ Weld Data Controlling	

■ **Education in regular intervals-** The seminar leader guarantees an optimum learning progress for your employees.

Individual, practical and effective

CLOOS training courses take place in small groups of max. 6 persons and have their own specific and individual character. Each group has its own room for theoretical training for the duration of the course.

The knowledge and skills learnt are reinforced by practical exercises with real robot systems and actual components. For the practical part of the welding machine and welding technology courses all our QINEO® power sources are available.

Training concepts, tailored to different target groups and methodically and didactically designed, provide the necessary knowledge to achieve the instructional objectives.

Related to product and application

Training concepts tailored to different target groups and with didactical background provide the necessary knowledge about:

- General information
- Operation
- Programming
- Sensor technology
- Offline programming
- Software products
- Maintenance and repair
- Welding technology
- Operation, programming and setting
- Process optimisation

At present we offer more than 40 product-related standard seminars. In addition, we also offer individual trainings that particularly meet the customers' requirements. If requested, we also offer you inhouse seminars.

Seminar documents

Each participant receives a folder with detailed training documents at the beginning of the seminar.

The folder contains:

- Programming instructions and/or service manual
- System descriptions of robots and welding power sources
- Current information about robot and welding technology

Furthermore, the participant will receive a certificate of attendance at the end of the course.

Your certificate

CLOOS
weld your way.
CERTIFICATE
Herr
Hans Mustermann
hat in der Zeit vom 01. 10. 2012 bis 05. 10. 2012 an dem Lehrgang
Programmieren Basic-Course
Stufe 1 – Steuerung ROTROL®
der CARL CLOOS SCHWEISSTECHNIK GMBH teilgenommen.
Inhalte
Sicherheitsvorschriften nach: DIN EN ISO 10218
Aufbau und Funktion des Roboters
Kommandos und Befehle
Programmieren mit dem Programmierhandgerät (PHG)
Programmieren mit der Tastatur
Schweißparameterlisten
Digitale und analoge Ein- und Ausgänge
Sichern und Laden von Programmen
Referent: Name des Trainers
Haiger, 05. 10. 2012

Further information about our seminars

Dates

In our modern CLOOS training centre in Haiger seminars for several groups take place every week. Appointments by telephone are possible at any time. 8 to 10 weeks before delivery of a robot system our customers are invited to the respecive seminars.

Seminar place

Your seminar place is the CLOOS training centre in Haiger. In special cases and under certain conditions the courses can take place in the customers' factory. But this requires optimum technical and room conditions in the customers' factory.

Seminar period

The average seminar period is 7.5 hours per day. The training time is from 8:00 o'clock (arrival day 9:00 o'clock) until 16:30 o'clock (Friday approx. 12:00 o'clock). For more information please see the respective seminar description.

Seminar language

All courses can take place in German and English.

Seminars with translator

If requested, our seminars can be translated in other languages such as French, Spanish or Russian for example. Please contact our training centre to determine the possibilities.

Seminar fees

The fees of the individual seminars can be found in the attached price list of the seminar program or registration if they are not separately listed in the CLOOS order confirmations.

The costs for travel, room and board have to be borne by every seminar participant.

How to find us

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Telefax +49 (0)2773 85-346
E-mail: training@cloos.de
www.cloos.de

By car

From the north:

- Follow the autobahn A45 until exit Haiger/Burbach (24).
- Turn right to the B54, direction Dillenburg/Haiger.
- Leave the roundabout at the second exit and follow the B54.
- Turn right to the B277 in the direction of Dillenburg/Haiger at the next crossroad.
- Follow the B277 until the end of the village Haiger/Allendorf.
- Turn right at the crossroads and follow the road for approx. 3 km until the 4th traffic light.
- Turn right into the Werkstrasse. After 300 m you are at CLOOS.

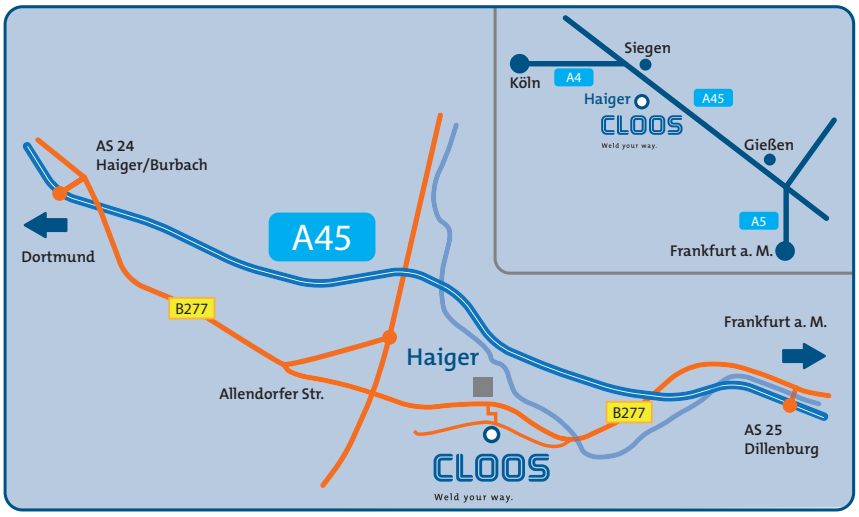
From the south:

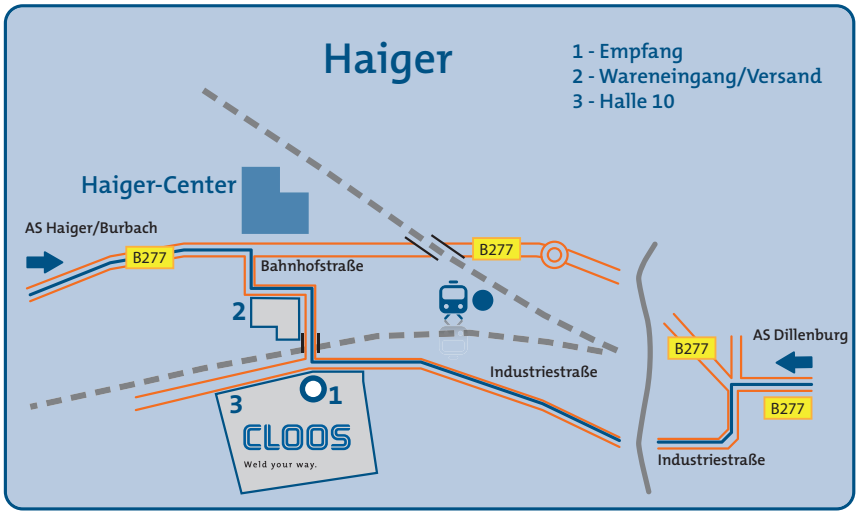
- Follow the autobahn A45 until exit Dillenburg (25).
- Leave the autobahn and drive on the B277 in the direction of Haiger.
- Follow the B277 in the direction of Haiger for approx. 3 km.
- Turn left into the Industriestrasse at the next crossroads.
- Follow the Industriestrasse. After 1 km you are at CLOOS.

We are looking forward to your visit!

By train

- Leave the train at Haiger station.
- After a walk of approx. 10 min Fußweg you are at CLOOS.





Seminars about Information and Products

Get basic information about the CLOOS welding and robot technology. Learn the basics of QIROX® robots and QINEO® welding machines.

	QR-TR-P **Product seminar** **QIROX® Robots and QINEO® Welding power sources**
	Only for Cloos subsidiaries, representations and authorised dealers.
Target group	People who wish to get acquainted with robot systems and welding power sources. ■ Managers ■ Employees of the departments Demonstration, Customer Service, Sales
Aims of the course	The participant is able to ■ identify the numerous CLOOS products and components. ■ differ the CLOOS robots with regard to function and application. ■ recognise various robot generations. ■ name robot operating systems and program functions. ■ classify peripheral components of robot systems. ■ differ compact cells, compact and robot systems. ■ classify accessories, interfaces, sensors and software products with regard to their functions. ■ name welding processes and to judge them partly. ■ move the robot and generate a simple program. ■ recognise the variety of the CLOOS automation by means of application examples. ■ explain the CLOOS software products. ■ name the QINEO® product range and explain their functions. ■ name and differ various welding processes.
Precondition	No
Seminar period	3 days
Seminar times	1st day, 09:00 a.m. till 04:30 p.m. 2nd + 3rd day, 08:00 a.m. till 04:30 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)

Content	■ Presentation of the CLOOS company (with image video) ■ CLOOS Robot controller (QIROX® - QRX/ROTROL - RII) ■ Operating system, controller, teach pendant ■ Teach pendant menu programming ■ Program functions ■ Peripheral components ■ Options and accessories ■ Overview of the sensors (tactile, arc and laser sensors) ■ Overview of the interfaces (information/possibly function description) ■ Compact cells/Compact systems ■ Robot systems/Automated welding systems ■ CLOOS Software products (PDM, WDM, UMS, RSM, Carola Edi) ■ QINEO® series (the new CLOOS welding machine generation) ■ Welding processes (Speed Weld, Vari Weld, Cold Weld etc.)
Documents	Seminar folder consisting of: ■ Handout ■ Current information material ■ Manuals/Function description (if required)
End of the course	Participation certificate

	QR-TR-I **Information robot technology**
Target group	People who wish to learn about the complex interrelationships of a robot system. ■ Managers ■ Technical employees
Aims of the course	The participant is able to ■ identify the numerous CLOOS products and components. ■ differ the CLOOS robots with regard to function and application. ■ recognise various robot generations. ■ name robot operating systems and program functions. ■ classify peripheral components of robot systems. ■ differ compact cells, compact and robot systems. ■ classify accessories, interfaces, sensors and software products with regard to their functions. ■ name welding processes and to judge them partly. ■ recognise the variety of the CLOOS automation by means of application examples.
Precondition	No
Seminar period	2 days
Seminar times	1st day from 09:00 a.m. till 04:30 p.m. 1st day from 08:00 a.m. till 04:30 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)

Content	■ Presentation of the CLOOS company (with image video) ■ CLOOS Robot controller (QIROX® QRX/ROTROL-RII) ■ Operating system, controller, teach pendant ■ Teach pendant menu programming ■ Program functions ■ Peripheral components ■ Options/Accessories ■ Overview of the sensors (tactile, arc and laser sensors) ■ Overview of the interfaces (information sheet) ■ Compact cells/Compact systems ■ Robot systems/Automated welding systems ■ QINEO® series (the new CLOOS welding machine generation) ■ Factory tour
Documents	Seminar folder consisting of: ■ Handout ■ Current robot information
End of the course	Participation certificate

QR-TR-O
Operator
Operator of the robot system

Target group	Users who are in charge of the robot handling (robot operators)
Aims of the course	The participant is able to ■ explain the essential items of the DIN EN ISO 10218 safety standard, ■ handle the axes and degrees of freedom of the QIROX robots, ■ explain and apply the functioning of the TEACH programming, ■ interpret messages, warnings and error messages, ■ execute test runs of user programs, ■ insert and change programmed points, ■ optimise weld seams, ■ adjust the welding equipment and keep it in operation, ■ organise and administer user programs.
Precondition	No
Seminar period	3 days
Seminar times	Monday, 09:00 a.m. till 04:30 p.m. Tuesday to Thursday 08:00 a.m. till 04:30 p.m. Friday 08:00 a.m. till approx. 12:00 p.m.
Participants	at least 2 persons, max. 6 persons per seminar (individual training on request)

Content	■ Safety regulations according to DIN EN ISO 10218 ■ Structure of a robot welding system ■ Elements of the industrial robot (controller, drives, mechanics, external axes, accessories) ■ Operating modes of the the robot controller: - Off - Manual reduced speed - Manual high speed - Automatic mode ■ Normal conditions and principles of the controller ■ Teach pendant programming (TEACH, EXE, EXE-STEP) ■ Correction of welding parameters ■ Correction of points in TEACH ■ Alignment of the welding torch and control of: "TCP" (Tool center point) and “TOV” (Tool Oriented Vector) ■ Reference points, behaviour in the case of program offset ■ Save and load of programs ■ Check and maintenance of the welding equipment
Documents	Seminar folder consisting of: ■ Programming manual ■ Current robot information ■ Exercise sheets
End of the course	Participation certificate

Programming seminars

The focus of these courses is on the programming of QIROX robots. Learn directly at the QIROX Controller or with the RoboPlan offline programming system. We also offer courses for the programming of laser sensors, welding power sources or working with the Tandem torch.

	QR-TR-P1 **Programming Basic Course**
Target group	■ Users who have to edit, correct and maintain the robot programs ■ Robot programmers
Aims of the course	The participant is able to ■ explain the essential items of the DIN EN ISO 10218 safety standard, ■ identify the axes and degrees of freedom of the QIROX robots, ■ explain and apply the functioning of the TEACH programming, ■ program via the teach pendant menu ■ create a functioning welding program, ■ do test runs and corrections of user programs ■ create welding parameter lists and to optimise weld seams, ■ interpret user-specific warnings and error messages, ■ correct programmed points, ■ link user programs with subroutines, ■ adjust the welding equipment and keep it in operation, ■ organise and administer user programs.
Precondition	■ Basic knowledge of welding technology ■ Ability to imagine the sequence of automatic operating cycles ■ Basic knowledge of electronic sequence of operations ■ Willingness, interest and ability to realise the knowledge learnt ■ Training in metal working ■ Technical understanding of material treatment and machining (processing)
Seminar period	5 days
Seminar times	Monday, 09:00 a.m. till 04:30 p.m. Tuesday to Thursday 08:00 a.m. till 04:30 p.m. Friday 08:00 a.m. till approx. 12:00 p.m.
Participants	at least 2 persons, max. 6 persons per seminar (individual training on request)

Content	■ Introduction /General ■ Safety briefing according to DIN EN ISO 10218 ■ Robot programming ■ Welding functions ■ Signalling technology ■ Program functions ■ System adjustments
Documents	Seminar folder consisting of: ■ Programming manual ■ Information sheets ■ Exercise sheets
End of the course	Participation certificate

QR-TR-P2
Programming Advanced Course

Target group	■ Users who have to edit, correct and maintain the robot programs ■ Robot programmers
Aims of the course	The participant is able to ■ synchronise the external robot axes, ■ use different coordinate systems, ■ transform, mirror and shift programs, ■ handle the customer-related options in the user program, ■ calculate with variables, ■ generate a welding program with variables and external axes, ■ create a user program incl. options, ■ generate and export working points via program commands, ■ program the tactile and the arc sensor.
Precondition	Completion of the course: ■ QR-TR-P1 Programming Basic Course
Seminar period	5 days
Seminar times	Monday, 09:00 a.m. till 04:30 p.m. Tuesday to Thursday 08:00 a.m. till 04:30 p.m. Friday 08:00 a.m. till approx. 12:00 p.m.
Participants	at least 2 persons, max. 6 persons per seminar (individual training on request)

Content	■ Repetition of contents of course part 1 ■ Coordinate systems (base-, hand-, workpiece coordinate system) ■ Cartesian shifting of spatial points (online transformation) ■ Synchronisation of external axes ■ Transformation and mirroring of user programs ■ Variables (applications, links) ■ Freely programmable oscillating figures (for vertical-up welds) ■ Function: Multilayer welding ■ Point generation via program command ■ Parallel shifting with a sensor ■ Arc sensor for short, long and spray arc ■ Function MANAX (Manual movement of external axes) ■ Other customer-related options
Documents	Seminar folder consisting of: ■ Programming manual ■ Information sheets ■ Exercise sheets
End of the course	Participation certificate

QR-TR-P3
Programming Expert Course

Target group	■ Users who program and support high-complex robot systems. ■ Robot programmers with at least one year of practical programming experience.
Aims of the course	■ currently in planning stage
Precondition	Completion of the course: ■ QR-TR-P1 Programming Basic Course ■ QR-TR-P2 Programming Advanced Course
Seminar period	3 days
Seminar times	Monday, 09:00 a.m. till 04:30 p.m. Tuesday and Wednesday 08:00 a.m. till 04:30 p.m.
Participants	at least 2 persons, max. 6 persons per seminar (individual training on request)
Content	■ currently in planning stage
Documents	Seminar folder consisting of: ■ Programming manual ■ Information sheets ■ Exercise sheets
End of the course	Participation certificate

QR-TR-PU

Programming with Teach Pendant Upgrade Course

from R23T to QIROX®

Target group	■ Users who have to edit, correct and maintain the robot programs ■ Robot programmers
Aims of the course	The participant is able to ■ explain the differences between the safety standards EN 775 and DIN EN ISO 10218. ■ distinguish and use the QIROX® menu levels. ■ create and correct programs in PROG mode. ■ program test runs and correct user programs with the QIROX® teach pendant. ■ create welding parameter lists and to optimise weld seams, ■ link user programs with subroutines, ■ organise and administer user programs.
Precondition	Completion of the course: ■ R1-TR-P1 Programmierung R32T Basic Course ■ and at least 1 year of programming experience with the ROTROL R23T controller
Seminar period	2 days
Seminar times	1st day from 09:00 a.m. till 04:30 p.m. 1st day from 08:00 a.m. till 04:30 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)

Content	**Introduction /General** ■ Safety briefing Differences between EN 775 and DIN EN ISO 10218. ■ Teach pendant programming with the QIROX® "Touch screen" teach pendant ■ Arrangement of the menu levels in the QIROX® teach pendant ■ Menu programming in mode: "TEACH" and "PROG" ■ Program functions ■ Corrections in the program run in "TEST" and "EXE-STEP" ■ Creation of welding parameter lists via teach pendant ■ Oscillation functions ■ Inputs and outputs of the robot controller ■ Create and call subroutines in the submenu ■ Access possibilities to other programs ■ Save and load programs ■ Alignment of the welding torch ■ Determination of "TCP" and "TOV"
Documents	Seminar folder consisting of: ■ Programming manual ■ Information sheets ■ Exercise sheets
End of the course	Participation certificate

QR-TR-RE

Programming Refresh Course

Programming with special contents

Target group	■ Robot programmers with at least one year of practical programming experience.
Aims of the course	The participant is able to ■ name and explain the contents of the courses. ■ use the agreed course contents on the robot. ■ user functions and commands which have not been used very often in the past. ■ recognise useful modifications on the own system and use it after the course.
Precondition	Completion of the course: ■ QR-TR-P1 Programming Basic Course ■ QR-TR-P2 Programming Advanced Course
Seminar period	By appointment
Seminar times	1st day from 09:00 a.m. till 04:30 p.m. Each further day from 08:00 a.m. till 04:30 p.m. (Friday 08:00 a.m. till approx. 12:00 p.m.)
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)

Content	**Introduction /General** ■ Safety regulations according to DIN EN ISO 10218 ■ Structure of a robot welding system ■ Training program with different degrees of difficulty **Robot programming** ■ Explanation of the agreed course contents: - QR-TR-P1 Programming Basic Course - QR-TR-P2 Programming Advanced Course **Welding functions** ■ Explanation of the agreed contents ■ Welding practice **System adjustments** ■ Repetition of the contents of the QR-TR-P1 course ■ (TCP, TOV, reference points; program offset) ■ Questions and suggestions of the participants
Documents	Seminar folder consisting of: ■ Programming manual ■ Information sheets ■ Exercise sheets
End of the course	Participation certificate

R1-TR-P1

R1-TR-P1 Programming R32T Basic Course

Target group	■ Users who have to edit, correct and maintain the robot programs ■ Robot programmers
Aims of the course	The participant is able to ■ explain the essential items of the EN 775 (DIN EN ISO 10218) safety standard, ■ handle the axes and degrees of freedom of the R32T robots, ■ explain and apply the functioning of the TEACH programming, ■ program via the teach pendant menu ■ create a functioning welding program, ■ do test runs and corrections of user programs ■ create welding parameter lists and to optimise weld seams, ■ interpret user-specific warnings and error messages, ■ correct programmed points, ■ link user programs with subroutines, ■ adjust the welding equipment and keep it in operation, ■ organise and administer user programs.
Precondition	■ Basic knowledge of welding technology ■ Ability to imagine the sequence of automatic operating cycles ■ Basic knowledge of electronic sequence of operations ■ Willingness, interest and ability to realise the knowledge learnt ■ Training in metal working ■ Technical understanding of material treatment and machining (processing)
Seminar period	5 days
Seminar times	Monday, 09:00 a.m. till 04:30 p.m. Tuesday to Thursday 08:00 a.m. till 04:30 p.m. Friday 08:00 a.m. till approx. 12:00 p.m.
Participants	at least 2 persons, max. 3 persons per seminar (individual training on request)

Content	■ Introduction /General ■ Safety briefing according to EN 775 (DIN EN ISO 10218) ■ Robot programming ■ Welding functions ■ Signalling technology ■ Program functions ■ System adjustments
Documents	Seminar folder consisting of: ■ Programming manual ■ Information sheets ■ Exercise sheets
End of the course	Participation certificate

R1-TR-P2
Programming R32T Advanced Course

Target group	■ Users who have to edit, correct and maintain the robot programs ■ Robot programmers
Aims of the course	The participant is able to ■ synchronise the external robot axes, ■ use different coordinate systems, ■ integrate customer-specific options in the working program ■ calculate with variables, ■ create a user program incl. options, ■ generate and export working points via program commands, ■ apply the tactile and the arc sensor
Precondition	■ Completion of the course: R1-TR-P1 Programming R32T Basic Course
Seminar period	5 days
Seminar times	Monday, 09:00 a.m. till 04:30 p.m. Tuesday to Thursday 08:00 a.m. till 04:30 p.m. Friday 08:00 a.m. till approx. 12:00 p.m.
Participants	at least 2 persons, max. 3 persons per seminar (individual training on request)
Content	**Introduction /General** ■ Safety briefing according to: EN775 (DIN EN ISO 10218) **Robot programming** ■ Program creation at test components ■ Program connections of the inputs/outputs ■ Coordinate systems (base-, hand-, workpiece coordinate system) ■ Cartesian shifting of spatial points ■ Synchronisation of external axes ■ Transformation and Mirroring ■ Variables ■ Freely programmable weaving patterns ■ Multilayer welding ■ Point generation via program command ■ Parallel shifting with a sensor ■ Arc sensor for short, long and spray arc ■ MANAX function ■ Customer-related options

Documents	Seminar folder consisting of: ■ Programming manual ■ Information sheets ■ Exercise sheets
End of the course	Participation certificate

QR-TR-RPL1
Offline Programming Robo-Plan Basic Course

Target group	■ Users who have to edit, correct and maintain the robot programs ■ Robot programmers
Aims of the course	The participant is able to ■ operate the graphical operating surface of RoboPlan. ■ handle the programming functions of the offline system. ■ create and modify paths and points. ■ simulate and check programs. ■ generate simple user programs offline via Robo-Plan.
Precondition	■ Completion of the course: QR-TR-P1 Programming Basic Course ■ PC knowledge
Seminar period	5 days
Seminar times	Monday, 09:00 a.m. till 04:30 p.m. Tuesday to Thursday 08:00 a.m. till 04:30 p.m. Friday 08:00 a.m. till approx. 12:00 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)
Content	**Introduction /General** ■ Safety briefing according to: DIN EN ISO 10218: **Offline programming** ■ Handling of the Robo-Plan operating surface ■ Import and positioning of components ■ Creation of welding paths via the welding path dialogue ■ Transfer and measuring path creation ■ Generation of the program code for the robot controller ■ Upload of working programs into Robo-Plan ■ Simulation and collision check ■ Customer-related features
Documents	Seminar folder consisting of: ■ Programming manual Robo-Plan ■ Information sheets
End of the course	Participation certificate

QR-TR-RPL2
Offline Programming Robo-Plan Advanced Course

Target group	■ Users who have to edit, correct and maintain the robot programs ■ Robot programmers
Aims of the course	■ currently in planning stage
Precondition	
Seminar period	5 days
Seminar times	Monday, 09:00 a.m. till 04:30 p.m. Tuesday to Thursday 08:00 a.m. till 04:30 p.m. Friday 08:00 a.m. till approx. 12:00 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)
Content	■ currently in planning stage
Documents	Seminar folder consisting of: ■ Programming manual Robo-Plan ■ Information sheets
End of the course	Participation certificate

QR-TR-LT1
Programming Online Laser Sensor Basic Course

Target group	■ Users who have to edit, correct and maintain the robot programs ■ System operators and robot programmers
Aims of the course	The participant is able to ■ name the basic components of the laser system. ■ show the risks and protective measures of laser radiation . ■ verify and correct the sensor calibration with TCP and TOV. ■ use the commands of the SeamTracker interface. ■ create simple working programs via online laser sensors. ■ create and select templates for online seam tracking.
Precondition	■ Completion of the course: QR-TR-P1 Programming Basic Course ■ Completion of the course: QR-TR-P2 Programming Advanced Course.
Seminar period	5 days
Seminar times	Monday, 09:00 a.m. till 04:30 p.m. Tuesday to Thursday 08:00 a.m. till 04:30 p.m. Friday 08:00 a.m. till approx. 12:00 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)
Content	■ Safety instructions according to DIN EN ISO 10218 and EN 60825-1 ■ Description and application possibilities of the sensor system ■ System components and mechanical/electrical installation ■ Maintenance instructions ■ Creation and verification of the sensor calibration, TCP and TOV ■ CAROLA commands for the SeamTracker interface ■ Use of the seam tracking software, template creation ■ Generation of different standard weld preparations ■ Practical application and programming examples
Documents	Seminar folder consisting of: ■ Programming manual laser sensors ■ Current robot information ■ Notes on laser protection ■ Technical issues ■ Application examples
End of the course	Participation certificate

QR-TR-LT2
Programming Online Laser Sensor Advanced Course

Target group	■ Users who have to edit, correct and maintain the robot programs incl. adaptive parameter adjustment. ■ Robot programmers
Aims of the course	The participant is able to ■ intensify the trained skills of the basic course. ■ name the different adaptive functions. ■ use the adaptive welding parameter selection in the case of weld tolerances. ■ use suitable sensor functions for multi-layer programming. ■ put the learned skills of programming examples into practice.
Precondition	■ Completion of the course: QR-TR-P1 Programming Basic Course ■ Completion of the course: QR-TR-P2 Programming Advanced Course. ■ Completion of the course: QR-TR-LT1 Programming Online Laser Sensor Basic Course
Seminar period	2 days
Seminar times	1st day, 09:00 a.m. till 04:30 p.m. 2. day, 08:00 a.m. till 04:30 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)
Content	■ Creation of adaptive templates via weld seam detection software ■ Adaptive mode 0: Constant adaptive control (offline measurement) ■ Adaptive mode 1: Discrete adaptive control (List conversion) ■ Adaptive mode 2: Linear adaptive control (online adjustment) ■ Adaptive mode 3: Complex adaptive control (multiple adjustment) ■ Application of the Seamtrace function to the multi-layer technology ■ Practical application and programming examples **Note:** The parameter adjustment is made on the robot system only in simulation mode and without welding technology.
Documents	■ QR-TR-LT2 Programming Online Laser Sensor Advanced Course The participants are asked to bring the folder of the basic course.
End of the course	Participation certificate

QR-TR-LS
Programming Offline Laser Sensor

Target group	■ Users who have to edit, correct and maintain the robot programs ■ System operators and robot programmers
Aims of the course	The participant is able to ■ name the basic components of the laser system. ■ show the risks and protective measures of laser radiation . ■ verify and correct the sensor calibration with TCP and TOV. ■ create simple working programs via offline laser sensors. ■ create and select templates for offline seam tracking. ■ use working programs with adaptive weld parameter selection.
Precondition	■ Completion of the course: QR-TR-P1 Programming Basic Course ■ Completion of the course: QR-TR-P2 Programming Advanced Course.
Seminar period	5 days
Seminar times	Monday, 09:00 a.m. till 04:30 p.m. Tuesday to Thursday 08:00 a.m. till 04:30 p.m. Friday 08:00 a.m. till approx. 12:00 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)
Content	■ Safety instructions according to DIN EN ISO 10218 and EN 60825-1 ■ Description and application possibilities of the sensor system ■ System components and mechanical/electrical installation ■ Maintenance instructions ■ Creation and verification of the sensor calibration, TCP and TOV ■ CAROLA commands for the sensor parameterisation ■ Use of the seam tracking software, template creation ■ Combined programming of QIROX® and Q-S-LS-L/S ■ Use of manual and menu-guided programming technics ■ Data management for data backup ■ Practical application and programming examples ■ Welding parameter selection in the case of component tolerances in the weld geometry

Documents	Seminar folder consisting of: ■ Programming manual Laser sensor QR-SN-LS-L/S ■ Current robot information ■ Notes on laser protection ■ Technical issues ■ Application examples
End of the course	Participation certificate

QR-TR-SP
Software products
PDM, UMS, RMS, Carola Edi

Target group	■ Users who have to edit, correct and maintain the robot programs ■ Robot programmers
Aims of the course	The participant is able to ■ use the software products according to their possibilities.
Precondition	■ General knowledge about the functions of the robot system
Seminar period	1-2 days depending on the content
Seminar times	1st day from 09:00 a.m. till 04:30 p.m., 2nd day from 08:00 a.m. till 04:30 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)
Content	**PDM - Process Data Monitoring** ■ Product description and system requirements ■ Software installation and adjustment of the Rotrol network ■ Display of the current system state ■ Time evaluation ■ Analysis of the produced component and the weld seams in detail ■ Component protocols and data management
	RSM - Remote Service Manager ■ Special safety briefing for the RMS application ■ Product description and system requirements ■ Software installation and adjustment of the Rotrol network ■ Display of the current system state ■ Connection and diagnostics data
	UMS - User Management System ■ Product description and system requirements ■ Software installation and adjustment of the Rotrol network ■ Display of the current system state ■ Design as PC and tech pendant version ■ Documentation and evaluation of the user data via the CLOOS PDM software
	Carola Edi - Carola Editor ■ Product description and system requirements ■ Software installation and adjustment of the Rotrol network ■ Display of the current system state ■ Communication with the robot controller

Documents	Seminar folder consisting of: ■ Operating manuals of the different software products
End of the course	Participation certificate

QR-TR-SC
CLOOS Safety Controller

Only for Cloos subsidiaries, representations and authorised dealers.

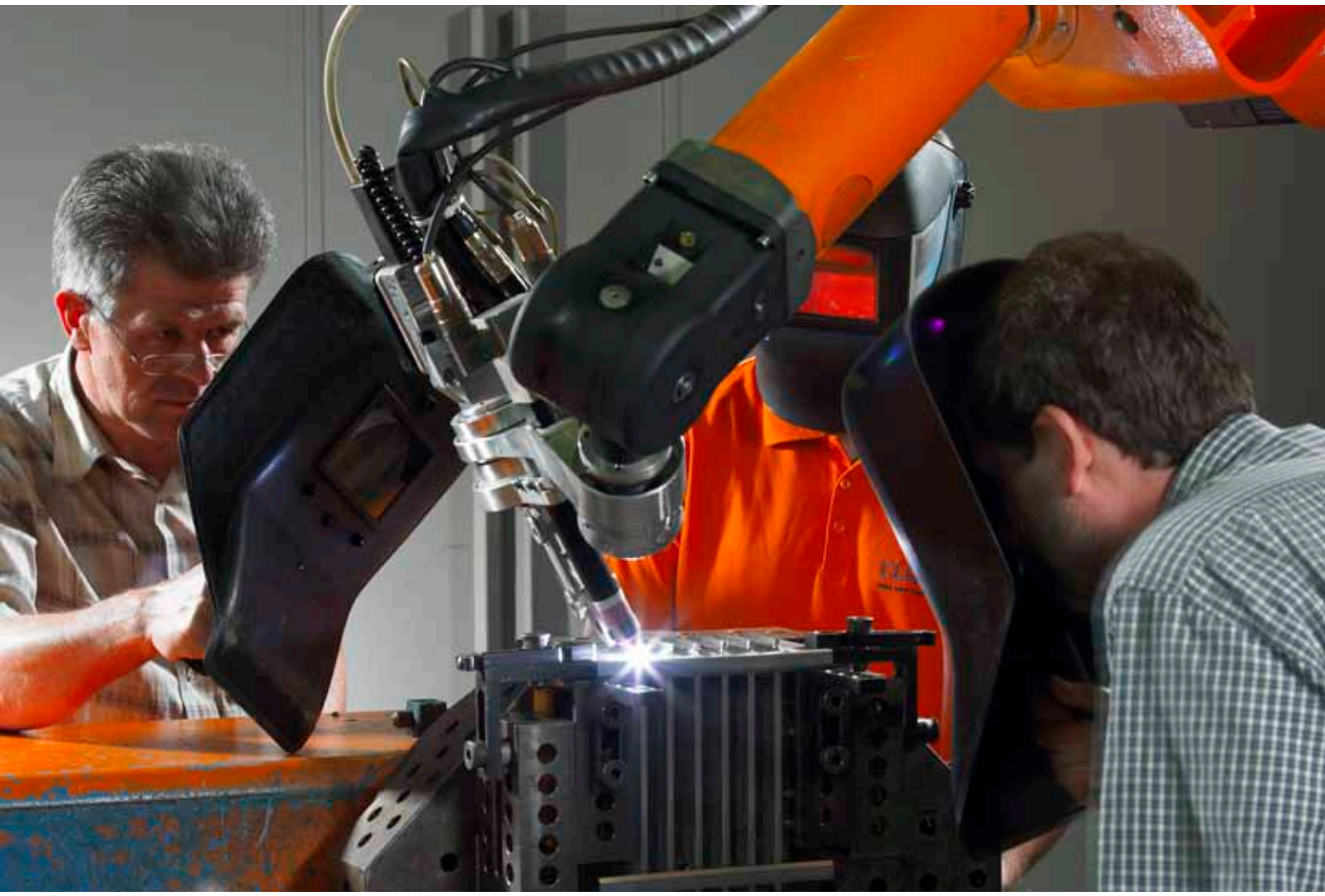
Target group	■ Robot programmers and service technicians
Aims of the course	The participant is able to ■ configure the robot system with Safety Controller
Precondition	■ Completion of the course: QR-TR-P1 Programming Basic Course
Seminar period	1 day
Seminar times	09:00 a.m. till 04:30 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)
Content	**Introduction** ■ Access rights ■ Technical structure **Generating the world model** ■ CSC configuration program **Check "World model"** ■ Check of the Cartesian spaces (TEACH-T_W_E) ■ Check of the single axis positions/idle positions **TCP/Torch changing system**
	Synchronous position ■ Generation/check **Service menu** ■ Dialogue "Check" ■ FLAG display **Programming (CSCIO)** **SPS program** ■ Transfer of SPS file ■ Digital I/O SPS ■ Test SPS functions

Documents	Seminar folder consisting of: ■ Operating Instructions
End of the course	Participation certificate **Serves as proof to obtain the access right for the CSC controller**

QR-TR-RW
Robot Welding
Welding with the robot

Target group	■ Users who have to edit, correct and maintain the robot programs ■ Robot programmers
Aims of the course	The participant is able to ■ judge and apply the different welding processes. ■ recognise and judge the process limits. ■ optimise welding parameters at the robot. ■ optimise robot user programs with regard to the welding technology. ■ recognise welding faults.
Precondition	■ Completion of the course: QR-TR-P1 Programming Basic Course
Seminar period	3 days
Seminar times	1st day: 09:00 a.m. till 04:30 p.m., 2nd+3rd day: 08:00 a.m. till 04:30 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)
Content	**Introduction /General** ■ Safety briefing according to: DIN EN ISO 10218: ■ Repetition of the content of course: QR-TR-P1
	Robot programming ■ Programming of different workpieces ■ Programming of the welding machine (QUINTO II/QINEO®) ■ Serial control of the welding machine (WSPAR commands) ■ Practical exercises with the robot ■ Welding basics ■ Welding with different arc types ■ Process technology errors ■ Correct machine equipment ■ Programming of weld data monitoring ■ Programming and welding of example workpieces

	Demo ■ Arc sensor ■ Gas nozzle sensor ■ Tandem technology
Documents	Seminar folder consisting of: ■ Programming manual ■ Exercise sheets ■ Information sheets
End of the course	Participation certificate



QR-TR-TW
Robot Tandem Welding

Target group	■ Users who have to edit, correct and maintain the robot programs ■ Robot programmers
Aims of the course	The participant is able to ■ explain the Tandem welding process. ■ optimise the Tandem parameters. ■ program Master and Slave wire.. ■ show the differences between synchronous and asynchronous pulses ■ determine the Tandem torch adjustments. ■ program arc seam tracking with Tandem. ■ maintain and adjust torch and cable assemblies. ■ determine the TCP (Tool Centre Point) at the Tandem torch.
Precondition	■ Completion of the course: QR-TR-P1 Programming Basic Course ■ Basic knowledge of the MIG/MAG welding technology
Seminar period	2 days
Seminar times	1st day: 09:00 a.m. till 04:30 p.m., 2nd day: 08:00 a.m. till 04:30 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)
Content	**Introduction /General** ■ Safety briefing according to: DIN EN ISO 10218: ■ Repetition of contents of course part 1 **Welding with the robot** ■ Definition and integration according to DVS, process variants ■ Schematic diagram of double wire and Tandem welding ■ Deposition rates in comparison ■ Tandem equipment (requirements) ■ Basic adjustment on the welding machine ■ Operating modes and parameter adjustment ■ Control possibilities ■ Technical data ■ Process limits of Tandem welding ■ Practical welding with the Tandem torch ■ Deposition rate when MIG/MAG welding steel/aluminium ■ MAG High-capacity welding according to DVS bulletin 0909, ■ Tandem welding with the robot

Documents	Seminar folder consisting of: ■ Programming manual ■ Exercise sheets ■ Information sheets
End of the course	Participation certificate

Seminars QIROX® Service

Well educated service technicians for the maintenance of your production systems guarantee your productivity. Whether for electrical or mechanical units of robots or welding power sources: in our seminars you will be well educated by our specialists.

QIROX V6	**QR-TR-SEL-V6** **Service for electricians QIROX® V6**
Target group	■ Users who are in charge of maintenance, fault finding and repair work on robot systems ■ Maintenance personnel, electrical and service engineers
Aims of the course	The participant is able to ■ explain the essential items of the DIN EN ISO 10218 safety standard, ■ Finding and elimination of faults. ■ Replacement of components (e.g. insert cards, power supply units). ■ Adjustment of functional groups (e.g. servo controllers).
Precondition	■ Vocational education in the electrical engineering * ■ Willingness, interest and ability to realise the knowledge learnt * the participant confirms that he/she is an electrically instructed person (qualified electrician/Elektrofachkraft).
Seminar period	3 days
Seminar times	Monday, 09:00 a.m. till 04:30 p.m. Tuesday and Wednesday 08:00 a.m. till 04:30 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)

Content	**Introduction /General** ■ Safety briefing according to DIN EN ISO 10218 ■ Introduction to the robot technology ■ Construction and components of robots (controller, drives, mechanics) **Robot programming** ■ Explanation of the operating modes (Off, manual, reduced/high speed, Auto) ■ Creation of a test program **Robot Control Cabinet** ■ Construction and function of individual components in PC rack ■ Operating and programming elements and their interfaces ■ Explanation of the block diagrams ■ Function of the power supply units ■ Power supply units and their tasks ■ Interfaces to the peripheral equipment (analogue and digital inputs and outputs) ■ Drives and measuring systems ■ Function, structure and setting of servo amplifiers ■ Preventive maintenance on the robot (lubrication and greasing) ■ Control the "TCP" (Tool center point) and the torch orientation "TOV" (Tool orientation vector) ■ Adjustment of robot mechanics ■ Finding of practical faults
Documents	Seminar folder consisting of: ■ Service manual ■ Exercise sheets ■ Information sheets
End of the course	Participation certificate

QR-TR-SEL-V5
Service for electricians QIROX® V5

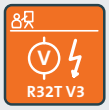
Target group	■ Users who are in charge of maintenance, fault finding and repair work on robot systems ■ Maintenance personnel, electrical and service engineers
Aims of the course	The participant is able to ■ explain the essential items of the DIN EN ISO 10218 safety standard, ■ Finding and elimination of faults. ■ Replacement of components (e.g. insert cards, power supply units). ■ Adjustment of functional groups (e.g. servo controllers).
Precondition	■ Vocational education in the electrical engineering * ■ Willingness, interest and ability to realise the knowledge learnt * the participant confirms that he/she is an electrically instructed person (qualified electrician/Elektrofachkraft).
Seminar period	3 days
Seminar times	Monday, 09:00 a.m. till 04:30 p.m. Tuesday and Wednesday 08:00 a.m. till 04:30 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)

Content	**Introduction /General** ■ Safety briefing according to: DIN EN ISO 10218: ■ Introduction to the robot technology ■ Construction and components of robots (controller, drives, mechanics) **Robot programming** ■ Explanation of the operating modes (Off, manual, reduced/high speed, Auto) ■ Creation of a test program **Robot Control Cabinet** ■ Construction and function of individual components in PC rack ■ Operating and programming elements and their interfaces ■ Explanation of the block diagrams ■ Function of the power supply units ■ Power supply units and their tasks ■ Interfaces to the peripheral equipment (analogue and digital inputs and outputs) ■ Drives and measuring systems ■ Function, structure and setting of servo amplifiers ■ Preventive maintenance on the robot (lubrication and greasing) ■ Control the "TCP" (Tool center point) and the torch orientation "TOV" (Tool orientation vector) ■ Adjustment of robot mechanics ■ Finding of practical faults
Documents	Seminar folder consisting of: ■ Service manual ■ Exercise sheets ■ Information sheets
End of the course	Participation certificate

R2-TR-SEL-V4
Service electricians QIROX® V4

Target group	■ Users who are in charge of maintenance, fault finding and repair work on robot systems ■ Maintenance personnel, electrical and service engineers
Aims of the course	The participant is able to ■ explain the essential items of the DIN EN ISO 10218 safety standard, ■ Finding and elimination of faults. ■ Replacement of components (e.g. insert cards, power supply units). ■ Adjustment of functional groups (e.g. servo controllers).
Precondition	■ Vocational education in the electrical engineering * ■ Willingness, interest and ability to realise the knowledge learnt * the participant confirms that he/she is an electrically instructed person (qualified electrician/Elektrofachkraft).
Seminar period	3 days
Seminar times	Monday, 09:00 a.m. till 04:30 p.m. Tuesday and Wednesday 08:00 a.m. till 04:30 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)

Content	**Introduction /General** ■ Safety briefing according to: DIN EN ISO 10218: ■ Introduction to the robot technology ■ Construction and components of robots (controller, drives, mechanics) **Robot programming** ■ Explanation of the operating modes (Off, manual, reduced/high speed, Auto) ■ Creation of a test program **Robot Control Cabinet** ■ Construction and function of individual components in PC rack ■ Operating and programming elements and their interfaces ■ Explanation of the block diagrams ■ Function of the power supply units ■ Power supply units and their tasks ■ Interfaces to the peripheral equipment (analogue and digital inputs and outputs) ■ Drives and measuring systems ■ Function, structure and setting of servo amplifiers ■ Preventive maintenance on the robot (lubrication and greasing) ■ Control the "TCP" (Tool center point) and the torch orientation "TOV" (Tool orientation vector) ■ Adjustment of robot mechanics ■ Finding of practical faults
Documents	Seminar folder consisting of: ■ Service manual ■ Exercise sheets ■ Information sheets
End of the course	Participation certificate



R1-TR-SEL-V3
Service for electricians R32T V3

Target group	■ Users who are in charge of maintenance, fault finding and repair work on robot systems ■ Maintenance personnel, electrical and service engineers
Aims of the course	The participant is able to ■ explain the essential items of the DIN EN 775 (...10218) safety standard, ■ Finding and elimination of faults. ■ Replacement of components (e.g. insert cards, power supply units). ■ Adjustment of functional groups (e.g. R32T servo controllers).
Precondition	■ Vocational education in the electrical engineering * ■ Willingness, interest and ability to realise the knowledge learnt * the participant confirms that he/she is an electrically instructed person (qualified electrician/Elektrofachkraft).
Seminar period	3 days
Seminar times	Monday, 09:00 a.m. till 04:30 p.m. Tuesday and Wednesday 08:00 a.m. till 04:30 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)

Content	**Introduction /General** ■ Safety briefing according to: EN775 (DIN EN ISO 10218) ■ Introduction to the robot technology ■ Construction and components of robots (controller, drives, mechanics) **Robot programming** ■ Explanation of the operating modes (Off, T1, T2, Auto) ■ Creation of a test program **Robot Control Cabinet** ■ Construction and function of individual components in PC rack ■ Operating and programming elements and their interfaces ■ Explanation of the block diagrams ■ Function of the power supply units ■ Power supply units and their tasks ■ Interfaces to the peripheral equipment (analogue and digital inputs and outputs) ■ Drives and measuring systems ■ Function, structure and setting of servo amplifiers ■ Preventive maintenance on the robot (lubrication and greasing) ■ Control the "TCP" (Tool center point) and the torch orientation "TOV" (Tool orientation vector) ■ Adjustment of robot mechanics ■ Finding of practical faults
Documents	Seminar folder consisting of: ■ Service manual ■ Exercise sheets ■ Information sheets
End of the course	Participation certificate

	R1-TR-SE-V1-2 **Service for electricians R32T V1-2**
Target group	■ Users who are in charge of maintenance, fault finding and repair work on robot systems ■ Maintenance personnel, electrical and service engineers
Aims of the course	The participant is able to ■ explain the essential items of the DIN EN 775 (...10218) safety standard, ■ Finding and elimination of faults. ■ Replacement of components (e.g. insert cards, power supply units). ■ Adjustment of functional groups (e.g. R32T servo controllers).
Precondition	■ Vocational education in the electrical engineering * ■ Willingness, interest and ability to realise the knowledge learnt * the participant confirms that he/she is an electrically instructed person (qualified electrician/Elektrofachkraft).
Seminar period	3 days
Seminar times	Monday, 09:00 a.m. till 04:30 p.m. Tuesday and Wednesday 08:00 a.m. till 04:30 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)

Content	**Introduction /General** ■ Safety briefing according to: EN775 (DIN EN ISO 10218) ■ Introduction to the robot technology ■ Construction and components of robots (controller, drives, mechanics) **Robot programming** ■ Explanation of the operating modes (Off, T1, T2, Auto) ■ Creation of a test program **Robot Control Cabinet** ■ Construction and function of individual components in PC rack ■ Operating and programming elements and their interfaces ■ Explanation of the block diagrams ■ Function of the power supply units ■ Power supply units and their tasks ■ Interfaces to the peripheral equipment (analogue and digital inputs and outputs) ■ Drives and measuring systems ■ Function, structure and setting of servo amplifiers ■ Preventive maintenance on the robot (lubrication and greasing) ■ Control the "TCP" (Tool center point) and the torch orientation "TOV" (Tool orientation vector) ■ Adjustment of robot mechanics ■ Finding of practical faults
Documents	Seminar folder consisting of: ■ Service manual ■ Exercise sheets ■ Information sheets
End of the course	Participation certificate

QR-TR-SEM QRx

Service for mechanical engineers QRC/QRH, QRC-E/QRH-E

Target group	■ Users who are in charge of maintenance, fault finding and repair work on robot systems ■ Mechanical maintenance engineers
Aims of the course	The participant is able to ■ name the components of the robot mechanics and explain their functions. ■ name the "marks" of the robot axes. ■ adjust the robot mechanics via the "electronic spirit level". ■ explain the meaning of the "rough and fine adjustment". ■ adjust the "axis backlash" at the three manual axes. ■ exchange motor units and gear pinions. ■ check the different pinions for damages and grease them according to lubrication plan.
Precondition	■ A completed vocational education in a mechanical profession.
Seminar period	1 day
Seminar times	09:00 a.m. till 04:30 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)
Content	**Introduction /General** ■ Safety briefing according to: DIN EN ISO 10218: ■ Structure of the robot mechanics and the different axes ■ Robot "Teaching" (creation of a check program) ■ Mechanical axis backlash ■ Axes adjustment possibilities: 4, 5, 6 (adjustment of the gear backlash) **Adjustment** ■ Visual inspection of the marks ■ Adjustment of the robot mechanics (check Home position) ■ Adjustment of the robot mechanics via the "electronic spirit level" **Maintenance and inspection** ■ Lubrication and greasing (lubrication notes/lubricants) ■ Maintenance intervals ■ Function check of the mechanical brakes

Documents	Seminar folder consisting of: ■ Service manual ■ Exercise sheets ■ Information sheets
End of the course	Participation certificate

QR-TR-SEM R320

Service for mechanical engineers R320, R350, R410

Target group	■ Users who are in charge of maintenance, fault finding and repair work on robot systems ■ Mechanical maintenance engineers
Aims of the course	The participant is able to ■ name the components of the robot mechanics and explain their functions. ■ name the "marks" of the robot axes. ■ adjust the robot mechanics via the "electronic spirit level". ■ explain the meaning of the "rough and fine adjustment". ■ adjust the "axis backlash" at the three manual axes. ■ exchange motor units and gear pinions. ■ check the different pinions for damages and grease them according to lubrication plan.
Precondition	■ A completed vocational education in a mechanical profession
Seminar period	1 day
Seminar times	09:00 a.m. till 04:30 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)
Content	**Introduction /General** ■ Safety briefing according to: DIN EN ISO 10218: ■ Structure of the robot mechanics and the different axes ■ Robot "Teaching" (creation of a check program) ■ Mechanical axis backlash ■ Axes adjustment possibilities: 4, 5, 6 (adjustment of the gear backlash) **Adjustment** ■ Visual inspection of the marks ■ Adjustment of the robot mechanics (check Home position) ■ Adjustment of the robot mechanics via the "electronic spirit level" **Maintenance and inspection** ■ Lubrication and greasing (lubrication notes/lubricants) ■ Maintenance intervals ■ Function check of the mechanical brakes

Documents	Seminar folder consisting of: ■ Service manual ■ Exercise sheets ■ Information sheets
End of the course	Participation certificate

QR-TR-SEM R310

Service for mechanical engineers R260, R310, R360

Target group	■ Users who are in charge of maintenance, fault finding and repair work on robot systems ■ Mechanical maintenance engineers
Aims of the course	The participant is able to ■ name the components of the robot mechanics and explain their functions. ■ name the "marks" of the robot axes. ■ adjust the robot mechanics via the "electronic spirit level". ■ explain the meaning of the "rough and fine adjustment". ■ adjust the "axis backlash" at the three manual axes. ■ exchange motor units and gear pinions. ■ check the different pinions for damages and grease them according to lubrication plan.
Precondition	■ A completed vocational education in a mechanical profession
Seminar period	1 day
Seminar times	09:00 a.m. till 04:30 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)
Content	**Introduction /General** ■ Safety briefing according to: EN 775 (DIN EN ISO 10218) ■ Structure of the robot mechanics ■ Structure and function of the axes ■ Structure and function of eccentrics and bearings ■ Structure and function of the gear units ■ Structure, function and adjustment of compressed air system (R310) ■ Robot "Teaching" (creation of a check program) ■ Mechanical axis backlash ■ Adjustment possibilities of axes 1 - 6 (backlash adjustment) **Adjustment** ■ Visual inspection of the marks ■ Adjustment of the robot mechanics (check Home position) ■ Adjustment of the robot mechanics with reference tool (reference arm) **Maintenance and inspection** ■ Lubrication and greasing (lubrication notes/lubricants) ■ Maintenance intervals ■ Function check of the mechanical brakes

Documents	Seminar folder consisting of: ■ Service manual ■ Exercise sheets ■ Information sheets
End of the course	Participation certificate

	QR-TR-SO **Special Course** **also for one person**
Target group	■ All users of the CLOOS standard seminars
Aims of the course	■ on request
Precondition	■ on request
Seminar period	■ on request
Seminar times	Monday, 09:00 a.m. till 04:30 p.m. Tuesday to Thursday 08:00 a.m. till 04:30 p.m. Friday 08:00 a.m. till approx. 12:00 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)
Content	■ on request
Documents	■ on request
End of the course	Participation certificate

Seminars for QINEO® Products

Get basic information about the CLOOS welding technology. Know the possibilities of the QINEO® welding machines.

QINEO®, are the high-quality welding power sources by CLOOS which have been developed specifically for commercial and industrial welding purposes. They meet every demand of manual and automated welding. Moreover the modular QINEO® system allows individual solutions which can be adapted to your specific production requirements and objectives.

From capacity class to special equipment, each QINEO® is customised and supplemented by a comprehensive accessories program and matching services. With highest availability, shortest delivery times and best quality QINEO® welding power sources offer you considerable economical advantages.

- **QINEO BASIC**
  Makes manual welding easier
- **QINEO STEP**
  Makes manual welding easier
- **QINEO TRONIC**
  Infinitely adjustable welding for highest precision
- **QINEO TRONIC**
  Infinitely adjustable welding for highest precision
- **QINEO PULSE**
  The versatile welding machine for industrial applications
- **QINEO CHAMP**
  The new dimension in welding technology

www.qineo.de

QINEO® AUTOMOTIVE *QINEO® STEP* *QINEO PULSE* *QINEO® TRONIC* *QINEO CHAMP*

QN-TR-I
Information Welding Power Sources

Target group	■ Employees of the departments: Sales, Customer Service, Demonstration ■ Technical employees ■ Managers
Aims of the course	The participant is able to ■ recognise various welding power source robot generations. ■ distinguish different QINEO® operating modules and their functions. ■ judge welding processes and special functions. ■ recognise and judge process limits. ■ select the suitable welding power sources, processes and accessories for customer-related applications. ■ use the welding power sources in practice and select simple basic functions.
Precondition	None
Seminar period	2 days
Seminar times	1st day, 09:00 a.m. till 04:30 p.m. 2nd day, 08:00 a.m. till approx. 03:00 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)
Content	■ Presentation of the welding power source ■ Welding processes ■ General design of the MIG/MAG welding power sources ■ QINEO® operating modules ECO, MASTER, PREMIUM ■ Configuration menu ■ Diagnostics menu ■ CAN-Bus connection ■ Options
Documents	Seminar folder consisting of: ■ Current product catalogues ■ Documentation on CD ■ Information brochures
End of the course	Participation certificate

Seminars Adjustment Welding Power Sources

Get basic information about the operation and programming of CLOOS welding power sources.

QN-TR-E-PU
Adjustment QINEO® Pulse

Target group	■ Welding engineers, welding specialists ■ Welding practitioners, welders, demonstration welders ■ Master craftsmen, foremen, service technicians
Aims of the course	The participant is able to ■ recognise various welding power source robot generations. ■ distinguish different QINEO® operating modules and their functions. ■ judge welding processes and special functions. ■ recognise and judge process limits. ■ select the suitable welding power sources, processes and accessories for customer-related applications. ■ use the welding power sources in practice, adjust the configuration and interpret the diagnostics menu.
Precondition	Basic knowledge of the welding technology
Seminar period	2 days
Seminar times	1st day, 09:00 a.m. till 04:30 p.m. 2nd day, 08:00 a.m. till approx. 03:00 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)
Content	■ Presentation of the welding power source ■ Welding processes ■ General design of the MIG/MAG welding power sources ■ QINEO® operating modules ECO, MASTER, PREMIUM ■ Configuration menu ■ Diagnostics menu ■ CAN-Bus connection ■ Welding practice
Documents	Seminar folder consisting of: ■ Current operating manual ■ Documentation on CD ■ Information brochures
End of the course	Participation certificate

QN-TR-E-T
Adjustment QINEO® Tronic

Target group	■ Welding engineers, welding specialists ■ Welding practitioners, welders, demonstration welders ■ Master craftsmen, foremen, service technicians
Aims of the course	The participant is able to ■ recognise various welding power source robot generations. ■ distinguish different QINEO® operating modules and their functions. ■ judge welding processes and special functions. ■ recognise and judge process limits. ■ select the suitable welding power sources, processes and accessories for customer-related applications. ■ use the welding power sources in practice, adjust the configuration and interpret the diagnostics menu.
Precondition	Basic knowledge of the welding technology
Seminar period	2 days
Seminar times	1st day, 09:00 a.m. till 04:30 p.m. 2nd day, 08:00 a.m. till approx. 03:00 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)
Content	■ Presentation of the welding power source ■ Welding processes ■ General design of the MIG/MAG welding power sources ■ QINEO® operating modules ECO, MASTER, PREMIUM ■ Configuration menu ■ Diagnostics menu ■ CAN-Bus connection ■ Welding practice
Documents	Seminar folder consisting of: ■ Current operating manual ■ Documentation on CD ■ Information brochures
End of the course	Participation certificate

QN-TR-E-CH
Adjustment QINEO® Champ

Target group	■ Welding engineers, welding specialists ■ Welding practitioners, welders, demonstration welders ■ Master craftsmen, foremen, service technicians
Aims of the course	The participant is able to ■ recognise various welding power source robot generations. ■ distinguish different QINEO® operating modules and their functions. ■ use welding processes and special functions. ■ recognise and judge process limits. ■ select the suitable processes, gases and accessories for customer-related applications. ■ use the welding power sources in practice, adjust the configuration and interpret the diagnostics menu.
Precondition	Basic knowledge of the welding technology
Seminar period	2 days
Seminar times	1st day, 09:00 a.m. till 04:30 p.m. 2nd day, 08:00 a.m. till approx. 03:00 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)
Content	■ Presentation of the welding power source ■ Welding processes (AC/DC) ■ General design of the MIG/MAG welding power sources ■ QINEO® operating module PREMIUM ■ Configuration menu ■ Diagnostics menu ■ Expert Mode ■ Welding practice
Documents	Seminar folder consisting of: ■ Current operating manual ■ Documentation on CD ■ Information brochures
End of the course	Participation certificate

QN-TR-E-SB
Adjustment QINEO® Step, Basic

Target group	■ Welding engineers, welding specialists ■ Welding practitioners, welders, demonstration welders ■ Master craftsmen, foremen, service technicians
Aims of the course	The participant is able to ■ distinguish different QINEO® operating modules and their functions. ■ use welding processes and special functions. ■ recognise and judge process limits. ■ select the suitable processes, gases and accessories for customer-related applications. ■ use the welding power sources in practice, adjust the configuration.
Precondition	Basic knowledge of the welding technology
Seminar period	2 days
Seminar times	1st day, 09:00 a.m. till 04:30 p.m. 2nd day, 08:00 a.m. till approx. 03:00 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)
Content	■ Presentation of the welding power source ■ Welding processes ■ General design of the MIG/MAG welding power sources ■ Operating panels ■ Configuration menus ■ Welding practice
Documents	Seminar folder consisting of: ■ Current operating manual ■ Documentation on CD ■ Information brochures
End of the course	Participation certificate

QN-TR-E-QII
Adjustment QUINTO II

Target group	■ Welding engineers, welding specialists ■ Welding practitioners, welders, demonstration welders ■ Master craftsmen, foremen, service technicians
Aims of the course	The participant is able to ■ recognise various welding power source robot generations. ■ use welding processes and special functions. ■ recognise and judge process limits. ■ select the suitable processes, gases and accessories for customer-related applications. ■ use the welding power sources in practice. ■ adjust the configuration and interpret the diagnostics menu.
Precondition	Basic knowledge of the welding and process technology
Seminar period	2 days
Seminar times	1st day, 09:00 a.m. till 04:30 p.m. 2nd day, 08:00 a.m. till approx. 03:00 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)
Content	■ Presentation of the welding power source ■ Welding processes ■ General design of the MIG/MAG welding power sources ■ Control panel ■ Configuration menu ■ Diagnostics menu ■ Interfaces ■ Welding practice
Documents	Seminar folder consisting of: ■ Current operating manual ■ Documentation on CD ■ Information brochures
End of the course	Participation certificate

QN-TR-E-TP
Adjustment QINEO® Tronic, Pulse

Target group	■ Welding engineers, welding specialists ■ Welding practitioners, welders, demonstration welders ■ Master craftsmen, foremen, service technicians
Aims of the course	The participant is able to ■ recognise various welding power source robot generations. ■ distinguish different QINEO® operating modules and their functions. ■ use welding processes and special functions. ■ recognise and judge process limits. ■ select the suitable processes, gases and accessories for customer-related applications. ■ use the welding power sources in practice, adjust the configuration and interpret the service menu.
Precondition	Basic knowledge of the welding technology
Seminar period	2 days
Seminar times	1st day, 09:00 a.m. till 04:30 p.m. 2nd day, 08:00 a.m. till approx. 03:00 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)
Content	■ Presentation of the welding power source ■ Welding processes ■ General design of the MIG/MAG welding power sources ■ QINEO® operating modules ECO, MASTER, PREMIUM ■ Configuration menu ■ Diagnostics menu ■ Expert mode ■ Welding practice
Documents	Seminar folder consisting of: ■ Current operating manual ■ Documentation on CD ■ Information brochures
End of the course	Participation certificate

Seminars QINEO® Software Welding Power Sources

Get information about the QINEO® Software products and power source validation.

QN-TR-QDM
QINEO® Data Management

Target group	■ Welding engineers, welding specialists, welding practitioners ■ Machine and system operators, welding supervisors ■ Master craftsmen, foremen, service technicians
Aims of the course	The participant is able to ■ save data and reload to the welding power source. ■ define and administer users and cells. ■ import and export synergic characteristic curves. ■ modify and re-program characteristic curves. ■ administer jobs and SD jobs. ■ read and evaluate welding data logbooks. ■ operate the welding power source via QDM.
Precondition	■ Competent knowledge of the Windows operating system ■ Basic knowledge of the network technology
Seminar period	2 days
Seminar times	1st day, 09:00 a.m. till 04:30 p.m. 2nd day, 08:00 a.m. till approx. 03:00 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)
Content	■ Installation of the QDM software ■ Set-up of a network ■ Backup and Restore ■ User management ■ Characteristic curve management/Programming ■ Operation via QDM (PREMIUM QINEO® operating module) ■ Jobs and SD Jobs ■ Logbooks
Documents	Seminar folder consisting of: ■ Current operating manual ■ Documentation on CD ■ Information brochures
End of the course	Participation certificate

QN-TR-VALI
Validation (calibration)

	Only for Cloos subsidiaries, representations and authorised dealers.
Target group	■ Repair and maintenance staff ■ Service technicians and electricians ■ Electrical engineers
Aims of the course	The participant is able to ■ connect the necessary testing equipment properly. ■ effect the validation according to inspection manual and based on DIN 50504. ■ correctly enter the measured values in the inspection protocol.
Precondition	■ Vocational education in the electrical engineering ■ Certificate "Qualified electrician"
Seminar period	1 day
Seminar times	1st day, 09:00 a.m. till 04:30 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)
Content	■ Scope of application ■ Normative references ■ Terms ■ Accuracy classes ■ Repetition of validations ■ Validation of wire feed units ■ Performance of the complete validation
Documents	Seminar folder consisting of: ■ Current validation manual ■ Documentation on CD ■ Information brochures
End of the course	Participation certificate

QN-TR-QSD

Weld Data Monitoring (SD monitoring)

Welding power sources: QINEO® Tronic, Pulse, Champ

Target group	■ Welding engineers, welding specialists, welding practitioners ■ Machine and system operators, welding supervisors ■ Master craftsmen, foremen, service technicians
Aims of the course	The participant is able to ■ define the monitoring channels. ■ define minimum and maximum values. ■ define warning thresholds. ■ determine time delays and error times. ■ use the test welding mode. ■ use the function "Apply/Accept set value". ■ interpret the screen mask.
Precondition	■ Safe handling of the QINEO® operating module PREMIUM. ■ Competent welding knowledge
Seminar period	1 day
Seminar times	1st day, 09:00 a.m. till 04:30 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)
Content	■ Installation of the QSD module ■ Selection and adjustment of the monitoring channels ■ Limit values and warning thresholds ■ Test welding mode ■ Apply/Accept set value ■ Practical welding with a robot ■ Error processing on the robot controller
Documents	Seminar folder consisting of: ■ Current operating manual ■ Documentation on CD ■ Information brochures
End of the course	Participation certificate

Seminars QINEO® Processes

The highly efficient processes of the QINEO® welding power sources solve your welding tasks. In our courses you get familiar with these possibilities and learn how to use them perfectly.

	QN-TR-DP **DuoPulse with QINEO® Tronic, Tronic Pulse, Pulse, Champ**
Target group	■ Welding engineers, welding specialists, welding practitioners ■ Welding supervisors, welders ■ Master craftsmen, foremen
Aims of the course	The participant is able to ■ judge the application possibilities of DuoPulse ■ adjust the DuoPulse parameters. ■ judge the process limits. ■ create a define weld surface.
Precondition	■ Competent welding knowledge
Seminar period	1 day
Seminar times	1st day, 09:00 a.m. till 04:30 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)
Content	■ Presentation of the welding power source ■ General design of the MIG/MAG welding power sources ■ QINEO® operating modules MASTER, PREMIUM ■ Configuration menu ■ Diagnostics menu ■ Programming menu ■ DuoPulse process ■ Practical welding with different materials
Documents	Seminar folder consisting of: ■ Current operating manual ■ Documentation on CD ■ Information brochures
End of the course	Participation certificate

QN-TR-CW
Cold Weld with QINEO® Champ

Target group	■ Welding engineers, welding specialists, welding practitioners ■ Welding supervisors, welders ■ Master craftsmen, foremen
Aims of the course	The participant is able to ■ judge the application possibilities of Cold Weld. ■ exactly control the heat input into the workpiece. ■ adjust the Cold Weld parameters. ■ judge the process limits. ■ weld thin plates < 1mm.
Precondition	■ Competent welding knowledge
Seminar period	1 day
Seminar times	1st day, 09:00 a.m. till 04:30 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)
Content	■ Presentation of the welding power source ■ General design of the MIG/MAG welding power sources ■ QINEO® operating module PREMIUM ■ Configuration menu ■ Diagnostics menu ■ Programming menu ■ Cold Weld process ■ Practical welding with different materials
Documents	Seminar folder consisting of: ■ Current operating manual ■ Documentation on CD ■ Information brochures
End of the course	Participation certificate

QN-TR-PA

Pulsed Arc with QINEO® Tronic Pulse, Pulse, Champ

Target group	■ Welding engineers, welding specialists, welding practitioners ■ Welding supervisors, welders ■ Master craftsmen, foremen
Aims of the course	The participant is able to ■ judge the application possibilities of Pulsed Arc. ■ exactly control the heat input into the workpiece. ■ adjust the Pulsed Arc parameters. ■ judge the process limits. ■ weld thin plates of at least 1.5 mm.
Precondition	■ Competent welding knowledge
Seminar period	1 day
Seminar times	1st day, 09:00 a.m. till 04:30 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)
Content	■ Presentation of the welding power source ■ General design of the MIG/MAG welding power sources ■ QINEO® operating module PREMIUM ■ Configuration menu ■ Diagnostics menu ■ Programming menu ■ Pulsed Arc process ■ Practical welding with different materials
Documents	Seminar folder consisting of: ■ Current operating manual ■ Documentation on CD ■ Information brochures
End of the course	Participation certificate

QN-TR-RW
Rapid Weld with QINEO® Tronic, Tronic Pulse, Pulse, Champ

Target group	■ Welding engineers, welding specialists, welding practitioners ■ Welding supervisors, welders ■ Master craftsmen, foremen
Aims of the course	The participant is able to ■ judge the application possibilities of Rapid Weld. ■ define the changed weld preparations. ■ adjust the Rapid Weld parameters. ■ judge the process limits. ■ weld on one side with complete root formation.
Precondition	■ Competent welding knowledge
Seminar period	1 day
Seminar times	1st day, 09:00 a.m. till 04:30 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)
Content	■ Presentation of the welding power source ■ General design of the MIG/MAG welding power sources ■ QINEO® operating modules MASTER and PREMIUM ■ Configuration menu ■ Diagnostics menu ■ Programming menu ■ Rapid Weld process ■ Practical welding, fillet weld and butt weld
Documents	Seminar folder consisting of: ■ Current operating manual ■ Documentation on CD ■ Information brochures
End of the course	Participation certificate

Service seminars Welding Power Sources

Well educated service technicians for the maintenance of your production systems guarantee your productivity. In our seminars you will be well educated by our specialists.

	QN-TR-SE-BS **Service QINEO® Basic, Step**
Target group	■ Users who are in charge of maintenance, fault finding and repair work of welding power sources ■ Service and maintenance staff
Aims of the course	The participant is able to ■ explain the basic functions of the operation. ■ explain the function and the interaction of the components. ■ find and eliminate errors. ■ replace components (e.g. insert cards, power supply units). ■ upload software and characteristic curves (only QINEO® Step).
Precondition	■ Vocational education in the electrical engineering ■ Certificate "Qualified electrician" acc. to VDE 0100 ■ Education as electrically instructed person
Seminar period	1 day
Seminar times	1st day, 09:00 a.m. till 04:30 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)
Content	■ Safety instructions according to: VDE 0100, EN 60974-4, VDE 0544-4 ■ Introduction to the welding technology ■ General design of welding power sources ■ Construction and function of individual components ■ QINEO® operating module ■ Interfaces to the peripheral equipment ■ Wire drive units and measuring systems ■ Preventive maintenance ■ Practical fault finding
Documents	Seminar folder consisting of: ■ Service presentations ■ Documentation on CD ■ Information sheets
End of the course	Participation certificate

	QN-TR-SE-PC **Service QINEO® Pulse, Champ**
Target group	■ Users who are in charge of maintenance, fault finding and repair work of welding power sources ■ Service and maintenance staff
Aims of the course	The participant is able to ■ explain the basic functions of the operation. ■ explain the function and the interaction of the components. ■ find and eliminate errors. ■ replace components (e.g. insert cards, power supply units). ■ upload software and characteristic curves..
Precondition	■ Vocational education in the electrical engineering ■ Certificate "Qualified electrician" acc. to VDE 0100 ■ Education as electrically instructed person
Seminar period	1 day
Seminar times	1st day, 09:00 a.m. till 04:30 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)
Content	■ Safety instructions according to: VDE 0100, EN 60974-4, VDE 0544-4 ■ Introduction to the welding technology ■ General design of welding power sources ■ Construction and function of individual components ■ QINEO® operating modules ECO, MASTER, PREMIUM ■ Configuration menu ■ Diagnostics menu (PREMIUM) ■ Interfaces to the peripheral equipment ■ Wire drive units ■ Preventive maintenance ■ Practical fault finding
Documents	Seminar folder consisting of: ■ Service presentations ■ Documentation on CD ■ Information sheets
End of the course	Participation certificate

QN-TR-SE-SB
Service QINEO® Tronic, Tronic Pulse

Target group	■ Users who are in charge of maintenance, fault finding and repair work of welding power sources ■ Service and maintenance staff
Aims of the course	The participant is able to ■ explain the basic functions of the operation. ■ explain the function and the interaction of the components. ■ find and eliminate errors. ■ replace components (e.g. insert cards, power supply units). ■ upload software and characteristic curves.
Precondition	■ Vocational education in the electrical engineering ■ Certificate "Qualified electrician" acc. to VDE 0100 ■ Education as electrically instructed person
Seminar period	1 day
Seminar times	1st day, 09:00 a.m. till 04:30 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)
Content	■ Safety instructions according to VDE 0100, EN 60974-4, VDE 0544-4 ■ Introduction to the welding technology ■ General design of welding power sources ■ Construction and function of individual components ■ QINEO® operating modules ECO, MASTER, PREMIUM ■ Configuration menu ■ Diagnostics menu (PREMIUM) ■ Interfaces to the peripheral equipment ■ Wire drive units ■ Preventive maintenance ■ Practical fault finding
Documents	Seminar folder consisting of: ■ Service presentations ■ Documentation on CD ■ Information sheets
End of the course	Participation certificate

QN-TR-SE-SB
Service Quinto II

Target group	■ Users who are in charge of maintenance, fault finding and repair work of welding power sources ■ Service and maintenance staff
Aims of the course	The participant is able to ■ explain the basic functions of the operation. ■ explain the function and the interaction of the components. ■ find and eliminate errors. ■ replace components (e.g. insert cards, power supply units). ■ upload software and characteristic curves.
Precondition	■ Vocational education in the electrical engineering ■ Certificate "Qualified electrician" acc. to VDE 0100 ■ Education as electrically instructed person
Seminar period	1 day
Seminar times	1st day, 09:00 a.m. till 04:30 p.m.
Participants	at least 2 persons, max. 4 persons per seminar (individual training on request)
Content	■ Safety instructions according to: VDE 0100, EN 60974-4, VDE 0544-4 ■ Introduction to the welding technology ■ General design of welding power sources ■ Construction and function of individual components ■ Control panel ■ Configuration menu ■ Diagnostics menu ■ Interfaces to the peripheral equipment ■ Wire drive units (CK, CDD2) ■ Preventive maintenance ■ Practical fault finding
Documents	Seminar folder consisting of: ■ Service presentations, service manual ■ Documentation on CD ■ Information sheets
End of the course	Participation certificate

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There are more than 40 sales and service centres in our worldwide CLOOS organisation, which are at your disposal for sales and service. In addition, our experienced service team in Haiger can be called at any time for any problems. In this way we can ensure effective help on site if breakdowns occur.

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Additional information regarding QINEO® the new range of welding power sources can be obtained at

www.qineo.de

qineo®

Seminar 28/02/13 Subject to technical alterations. Errors and omissions excepted.

CLOOS

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